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Warren A Sklar
Renner Otto Boisselle & Sklar LLP
19th Floor
1621 Euclid Avenue
Cleveland, OH 44115

EXAMINER	
LESPERANCE, JEAN E	

ART UNIT	PAPER NUMBER
2674	11

DATE MAILED: 05/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/611,541	FERGASON, JAMES L.	
	Examiner	Art Unit	
	Jean E Lesperance	2674	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 March 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36,39,40 and 43-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *30* is/are allowed.

6)☒ Claim(s) *1-9,12,13,15-22,27,28,31-36,39,40, and 43-54* is/are rejected.

7)☒ Claim(s) *10,11.,14,23-26 and 29* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 July 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claims 1-36, 39, 40, and 43-54 are presented for examination.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 19-21 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The word "mount to position" is claimed in claims 19-21 but is not mention anywhere in the specification and does not make any sense. Correction is needed to make and/or use the invention.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-9, 12, 13, 15-18, 22, 27, 31-36, 39, 40, and 43-54 are rejected under 35 U.S.C. 102 (e) as being unpatentable over U.S. Patent # 6,130,784 ("Takahashi").

As for claim 1, Takahashi teaches a display system comprising a pair of displays Fig.4 (9a and 9b), the S and P waves are led to the two image display devices (9a and 9b) to illuminate simultaneously (column 16, lines 38-39) corresponding to each having a polarized light output, the directions of polarization of light emanating from the two image display devices 9a and 9b are set so that S and P waves, which are in an orthogonal relation to each other, emerge from the image display devices 9a and 9b (column 15, lines 50-54) corresponding to the polarization direction for both displays being the same, an angle of approximately 45 degrees with respect to each of the image display devices (9a and 9b) corresponding to the displays being at an angle to each other, and the images of the image display devices 9a and 9b are effectively superimposed on one another by the non-polarized beam splitter 4 having the non-polarizing half-mirror surface 40 that transmits a part of incident light from the image display devices 9a and 9b and reflects a part of the incident light (column 18, lines 51-56) corresponding to a beam splitter so positioned relative to the two displays at the bisectrix of said angle to combine images from the displays whereby one image is transmitted by the beam splitter and the other image is reflected by the beam splitter to provide direct view of images from the displays.

As for claim 2, Takahashi teaches an LCD display Fig.4 (9a) corresponding to the displays are flat panel LCDs.

As for claim 3, Takahashi teach an angle of approximately 45 degrees with respect to each of the image display devices (9a and 9b) corresponding to the LCDs are identical and the polarization of the LCDs are at 45 degrees to the horizontal, whereby the images of the image display devices 9a and 9b are effectively superimposed on one another by the non-polarized beam splitter 4 having the non-polarizing half-mirror surface 40 that transmits a part of incident light from the image display devices 9a and 9b and reflects a part of the incident light (column 18, lines 51-56) corresponding to an image from one LCD transmitted through the beam splitter for viewing and the image from the other LCD which is reflected from the beam splitter will have linear polarization at right angles.

As for claim 4, Takahashi teaches a light emitted from the light source 1 is separated by the polarizing half-mirror surface 40 into S wave and P wave, which are orthogonal polarized light components (column 16, lines 34-38) corresponding to polarizers are used to separate the images for right and left eye.

As for claim 5, Takahashi teaches a positive lens Fig.3 (72) corresponding to the polarizers are polarized lenses in eyeglass frames.

As for claim 6, Takahashi teaches The light, which is now S wave, reenters the composite optical system 3' and is reflected by the optical coupling/separating surface 40 to reach the observer's eyeball 10 (column 16, lines 58-61) corresponding to the polarization is modified by adding quarter wave plates, respectively, to the light paths from the LCDs so that the images from the respective displays as viewed via the beam splitter are separated by right and left circular polarized light.

As for claim 7, Takahashi teaches the direction of polarization of light emanating from each of the two liquid crystal display devices is rotated through 90 degrees from the incident light by the above-described phenomenon (column 15, lines 47-50) corresponding to circular polarization is created by a single quarter wave plate located between the beam splitter and the eye of a viewer.

As for claim 8, Takahashi teaches a cable 111 for transmitting external image and sound signals is led out from the display apparatus body unit 101 (column 30, lines 60-61) corresponding to a stereo pair makes up a selected region of the images from the displays.

As for claim 9, Takahashi teaches the transmissive liquid crystal display devices 9a and 9b are TN liquid crystal display devices. In this case, the twist angle is 90 degrees and are also in a vertical plane (column 17, lines 61-63) corresponding to the displays are disposed at right angles and are in the vertical planes.

As for claim 16, Takahashi teaches an LCD display Fig.4 (9a) which inherently includes red, green, and blue color sub pixels corresponding to the displays are made up of red green and blue color sub pixels to form picture elements and/or arranged to overlay each other so as to minimize color halos and color fringes.

As for claim 17, Takahashi teaches the superimposed images of the image display devices 9a and 9b exit from the optical coupling/separating element 4 in two orthogonal directions opposite to the directions of the incident light from the image display devices 9a and 9b (column 6, lines 16-20) corresponding to the directional organization of providing data to color sub pixels in one LCD is in one direction and the

directional organization of providing data to color sub pixels in the other LCD is in the opposite direction.

As for claims 15 and 18, Takahashi teaches FIG. 7 shows a part of the arrangement extending from the image display device 9 to the exit pupil 15. Two surfaces 31 and 32 constituting the viewing optical system 6 are both rotationally symmetric aspherical surfaces. Regarding the observation field angles, the horizontal field angle is 40 degrees, and the vertical field angle is 30.6 degrees (column 20, lines 52-58) corresponding to a field sequential signal is displayed such that alternate fields are displayed on the two displays so that each field is displayed for a full frame.

As for claim 22, Takahashi teaches the images of the image display devices 9a and 9b are effectively superimposed on one another by the non-polarizing beam splitter 4 having the non-polarizing half-mirror surface 40' that transmits a part of incident light from the image display devices 9a and 9b and reflects a part of the incident light. That is, a part of light from the image display device 9a passes through the non-polarizing beam splitter 4 and forms a light beam 13L in which it is superimposed on a part of light from the image display device 9b that is reflected by the non-polarizing beam splitter 4. On the other hand, a part of light from the image display device 9a is reflected by the non-polarizing beam splitter 4 and forms a light beam 13R in which it is superimposed on a part of light from the image display device 9b that passes through the non-polarizing beam splitter 4 (column 18, lines 51-65) corresponding to a light absorber for absorbing light from the beam splitter which is not directed to a viewer for viewing.

As for claims 27 and 28, Takahashi teaches the cable 111 may also be connected to a TV signal receiving tuner so as to enable the user to enjoy watching TV. Alternatively, the cable 111 may be connected to a computer to receive computer graphic images or message images or the like from the computer. To eliminate the bothersome cord, the head-mounted image display apparatus may be arranged to receive external radio signals through an antenna connected thereto (column 31, lines 4-14) corresponding to a data processing system for obtaining and organizing image data and presenting the image data for display and data processing system including a processor, a memory and connections to the respective display generators. It is inherent in a computer to include a data processing and a memory.

As for claim 31, Takahashi a polarizing half-mirror surface 40 in the composite optical system 3' is tilted at approximately 45 degrees with respect to the light source 1. Therefore, light emitted from the light source 1 is separated by the polarizing half-mirror surface 40 into S wave (reflected light) and P wave (transmitted light), which are orthogonal polarized light components. The S and P waves are led to the two image display devices 9a and 9b to illuminate them simultaneously. The image display devices 9a and 9b are TN liquid crystal display devices. In this case, the twist angle is set at 45 degrees. Illuminating light that is in a random polarization condition is formed into linearly polarized light by the polarizing half-mirror surface 40 and enters each liquid crystal display device in this state of polarization. The incident light passes through pixels of the liquid crystal display device to which a voltage is being applied (column 16, lines 32-47) corresponding to simultaneously displaying a left image on a display and a

right image on another display such that the left and right images have the optical polarization in the same direction, and using a beam splitter so positioned relative to the two displays that one can be viewed directly through the beam splitter and the other can be viewed by reflected light from the beam splitter combining those images in a common light path such that the optical polarization of the left image portion and the right image portion are different in such common light path.

As for claim 32, Takahashi teaches the light beam 13L passes along a similar ray path in a symmetric relation to the light beam 13R and forms the superimposed images of the image display devices 9a and 9b on the retina of the observer's left eye 10L as an enlarged virtual image (column 19, lines 14-18) corresponding to discriminating the respective images in the common light path using optical polarization.

As for claim 33, Takahashi teaches Px is a horizontal pixel pitch between each pair of adjacent pixels of the same color on said first and second image display devices; Py is a vertical pixel pitch between each pair of adjacent pixels of the same color on said first and second image display devices; Lx is an amount of displacement of pixels in a horizontal direction; and Ly is an amount of displacement of pixels in a vertical direction (column 32, lines 66 and 67 and column 33, lines 1-5) corresponding to the images are color images, each being composed of an assemblage of lines of different respective colors, and wherein the color image from one display is an arrangement In a one sequence and the color image from the other display is in an arrangement in the opposite sequence.

As for claims 34 and 35, Takahashi teaches the light internally reflected by the second surface 62R is reflected by the third surface 63R and exits from the viewing optical system 6R while being refracted through the second surface 62R. The light enters the observer's right eye 10R and forms the superimposed images of the image display devices 9a and 9b on the retina as an enlarged virtual image. The light beam 13L passes along a similar ray path in a symmetric relation to the light beam 13R and forms the superimposed images of the image display devices 9a and 9b on the retina of the observer's left eye 10L as an enlarged virtual image (column 19, lines 64-67 and column 20, lines 1-8) corresponding to a left eye image on a display, presenting a right eye image on another display that is at an angle relative to the first mentioned display, both said presenting steps presenting such images having optical polarization in the same direction, and using a beam splitter that is so positioned relative to the two displays that one can be viewed directly through the beam splitter and the other can be viewed by reflected light from the beam splitter combining in a substantially common light path the respective images such that the respective images in the common light path have different optical polarization.

As for claim 36, Takahashi the viewing optical system 6R furthers has a second surface 62R, which is a surface facing opposite to the first surface 61R and having both reflecting and transmitting actions, and a third surface 63R, which is a reflecting surface having a positive power (column 18, lines 20-24) corresponding to inverting the image data for one of the images for presenting for viewing in substantially superposed relation to the other image.

As for claims 12 and 39, Takahashi teaches the viewing optical system 6R furthers has a second surface 62R, which is a surface facing opposite to the first surface 61R and having both reflecting and transmitting actions, and a third surface 63R, which is a reflecting surface having a positive power (column 18, lines 20-24) and facing opposite to the first surface 63R can be done from top to bottom corresponding to inverting comprising inverting from top to bottom.

As for claims 13 and 40, Takahashi teaches the viewing optical system 6R furthers has a second surface 62R, which is a surface facing opposite to the first surface 61R and having both reflecting and transmitting actions, and a third surface 63R, which is a reflecting surface having a positive power (column 18, lines 20-24) and opposite to the first surface 61R can be inverting from left to right corresponding to inverting from left to right.

As for claim 43, Takahashi teaches Any of the illuminating optical systems in FIGS. 1 to 5 is either a common illuminating optical system or a combination of two illuminating optical systems provided approximately in symmetrical relation to each other with respect to a light source so that the illuminating light intensities of the two optical systems are equal to each other. In a case where one light source is used for one image display device as in ordinary liquid crystal display devices, it is necessary, in order to allow the image display devices 9a and 9b to simultaneously display images by picture signals generated from the same picture signal input externally, to synchronize the images in the same field, even if the images of the image display devices 9a and 9b are different from each other (column 12, lines 9-21) corresponding to the displays and

the beam splitter are in respective planes that are parallel to a common linear axis, A polarizing half-mirror surface 40 in the composite optical system is tilted at approximately 45 degrees with respect to the light source 1. Therefore, light emitted from the light source 1 is separated by the polarizing half-mirror surface 40 into S wave (reflected light) and P wave (transmitted light), which are orthogonal polarized light components (column 16, lines 32-38) corresponding to wherein light from the displays is linear polarized wherein the light from one of the displays that is reflected by the beam splitter has a polarization direction at 45 degrees (Fig.4) to the linear axis and is transmitted along an optical path, whereby upon reflection by the beam splitter the polarization direction of the reflected linear polarized light relative to the polarization direction of the linear polarized light prior to reflection is rotated 90 degrees (Fig.4) about the optical path.

As for claims 44, 50, and 53, Takahashi teaches the image display apparatus may be arranged such that a part of the image field at which the observer gazes is recognized by using a device for detecting the direction of the observer's line of sight, and only the gazed area and its vicinities are presented at high resolution (column 10, lines 16-21) corresponding to the polarized light output is linear polarized light.

As for claim 45, Takahashi teaches The display surfaces of transmissive liquid crystal display devices 9a and 9b, which are image display devices, are illuminated from the rear through the illuminating optical systems 5a and 5b (column 3, lines 21-24) corresponding to the displays are flat panel displays having a generally rectangular shape and the direction of polarization for both displays is diagonal relative to such

generally rectangular shape and it is inherent in the art the liquid crystal display to be rectangular.

As for claims 46 and 48, Takahashi teaches the composite optical system 3 has the optical coupling/separating action whereby images of the two image display devices 9a and 9b are combined together to form a composite image, and further has the action of a viewing optical system whereby the composite image of the image display devices 9a and 9b is projected into the observer's eyeball 10. Regarding the optical coupling/separating action, a polarizing half-mirror surface 40 reflects the S wave emanating from the image display device 9a and transmits the P wave emanating from the image display device 9b, as has been stated above (column 15, lines 55-65) corresponding to the beam splitter combines images from both displays to provide viewable overlapping images that respectively have crossed polarization.

As for claims 47, 51, and 54, Takahashi teaches the direction of polarization of the emergent light has been rotated through 90 degrees from that of the incident light. The directions of polarization of light emanating from the two image display devices 9a and 9b are set perpendicular to each other (column 3, lines 58-62) corresponding to the polarization for both displays is circular.

As for claim 49, Takahashi teaches light forming said images is linear polarized light, and the polarization direction of the linear polarized light forming one of said images is at 45 degrees to a linear a) and is transmitted (propagates) along an optical said combining comprising reflecting into such common light path such linear polarized light forming said one of said images by using the beam splitter with the beam splitter in

a plane is parallel to and intersects the linear axis, whereby the polarization direction of the reflected linear polarized light relative to the polarization direction of the linear polarized light prior to reflection Is rotated go degrees about the optical path.

As for claim 52, Takahashi teaches the displays are in respective planes that are parallel to a linear axis and light forming said images is linear polarized light, and the polarization direction of the linear polarized light forming one of said images is at 45 degrees to a linear axis and is transmitted (propagates) along an optical path, said combining comprising reflecting into such common light path such linear polarized light forming said one of said images by using the beam splitter with the beam splitter in a plane that Is parallel to and intersects the linear axis, whereby the polarization direction of the reflected linear polarized light relative to the polarization direction of the linear polarized light prior to reflection is rotated 90 degrees about the optical path.

Allowable Subject Matter

Claims 10, 11, 14, 23-26, and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The display system, in which one display for direct viewing through the beam splitter is in the vertical plane and the display that is reflected in the beam splitter is in the horizontal plane; a stereo signal received by the display system is a stereo image pair and the display directly viewed through the beam splitter is in the vertical plane and

is scanned from top to bottom and the display generator that is reflected by the beam splitter in the horizontal plane and is scanned from bottom to top; a stereo signal is received as a stereo pair, one of the stereo pairs is provided to one display and the other of the stereo pairs is provided to the other display, and the display viewed through the beam splitter is scanned from left to right and the display that is reflected by the beam splitter for viewing is scanned from right to left; an operating software to invert the data for presentation to one of the displays for displaying the data in inverted relation to the data displayed by the other displays; and a package comprising cover portions coupled by a hinge and movable to contain in protected relation the displays and beam splitter and openable to provide access and use of the displays and beam splitter.

Claim 30 is allowed.

Reasons for Allowance

3. The following is an examiner's statement of reasons for allowance:

None of the references either singularly or in combination, teaches or fairly suggests: A pair of displays, a beam splitter, a storage package containing the displays and beam splitter, the storage package including a pair of cover portions and a hinge connecting the cover portions allowing the cover portions to be closed to contained in protected closed relation the displays and beam splitter, and to be opened to expose the displays and beam splitter in respective operative relation such that the beam splitter is so positioned relative to the two displays that one can be viewed directly

through the beam splitter and the other can be viewed by reflected light from the beam splitter to present stereoscopic images for viewing.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Takahashi teaches a head-mounted projection display system featuring a beam splitter displays a simulated environment to an observer using a light-weight, low-cost, head-mounted projector and a retro-reflective screen. The display system optically co-locates the projector with the observer's eyes for effective use of either curved or flat retro-reflective screens. High screen gain achieved by the head-mounted projection display system makes inexpensive projector sources such as a cathode ray tube feasible. An alternative head-mounted display system also incorporating beam splitters produces an unlimited horizontal field of view, but with limited binocular overlap, while using multiple head-mounted image sources for each eye. None of the references either singularly or in combination, teaches or fairly suggests: "A pair of displays, a beam splitter, a storage package containing the displays and beam splitter, the storage package including a pair of cover portions and a hinge connecting the cover portions allowing the cover portions to be closed to contained in protected closed relation the displays and beam splitter, and to be opened to expose the displays and beam splitter in respective operative relation such that the beam splitter is so positioned relative to the two displays that one can be viewed directly through the beam splitter and the other can be viewed by reflected light from the beam splitter to present stereoscopic images for viewing".

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jean Lesperance whose telephone number is (703) 308-6413. The examiner can normally be reached on from Monday to Friday between 8:OOAM and 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Hjerpe, can be reached on (703) 305-4709 .

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Jean Lesperance

Art unit 2674

Date 5-6-2003

RICHARD HJERPE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600